Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

by a more elastic construction. Sanitary government is by the consent of the governed. In dealing with problems which affect social and industrial life, the epidemiologist must be possessed of breadth of vision, charity, and understanding, if he would lead his people into the paths of sanitary righteousness. Arbitrary house quarantine has brought about a reluctance to report communicable diseases and a disregard for quarantine that could have been avoided, in part at least, by the application of a little common sense and charity. The stiff-necked insistence on the letter of the law, which isolates the bread winner and separates mother and child, kills at a single blow the co-operation which has been developed by years of patient effort.

Consider the untold sums which have been expended in the past in disinfecting places in which infection did not exist, to the utter disregard of the living carriers of the seeds of disease. We smile at the reports of washing walls with antiseptics to the height of 3 feet for the purpose of killing the miasms of plague, but is it any more ridiculous than surface disinfection as carried on by so many of the public health agencies of to-day? Yet we continue, year after year, to burn incense to the unknown gods of disease, and at the expense of the taxpayer, whom we are endeavoring to evolve into a sanitarian.

Common sense in public health administration comprehends the employment of well trained, full time health officers, at adequate salaries, the appropriation of sufficient funds to enable such an official to administer the laws, and the enactment of specific legislation having as its foundation the basis of fact and practicality.

The medical profession as the leader in the campaign of sanitary renaissance must be guided by conservatism. The measures which we recommend must be practical. Fact, not theory, must be the basis of our action. Disease is not a ghost, but a reality. The common-sense application of knowledge alone will control it. Epidemiology is that knowledge. It can be put into force by persons trained in that science, provided they have funds and authority. The sanitary millenium will never come, but research and common-sense administration will bring it nearer.

SALT-WATER SWIMMING BATHS.

EFFECT OF CHLORINE TREATMENT ON THE BACTERIAL CONTENT.

By Wilfred H. Kellogg, Director of Laboratories, Department of Public Health, San Francisco, Cal.

The attention of the health department of San Francisco having been directed to swimming baths by inquiries on the part of the public and rumors that physicians had stated that people were contracting skin diseases and inflammations of the eye by bathing in certain baths, it was decided to undertake an investigation of the subject.

The institution most frequently the subject of complaint was one of the largest in the city using ocean water. The management were very attentive to details of ordinary cleanliness and the water was kept constantly circulating through heating coils and a set of Jewel sand filters, thence returning to the plunge. The water was completely changed at intervals varying from one to seven days, according to the number of people bathing.

Bacterial counts made in August and October, 1913, varied from 3,000 to 30,000 and *B. coli* was present usually in 1 cubic centimeter. Water coming from the filters contained as many as and sometimes more bacteria than that in the plunge.

The superintendent having indicated a desire to cooperate in every way possible to secure more ideal conditions, he was requested to add chloride of lime to the water, which was done in quantities of 50 pounds per million gallons. This amount was arrived at by some small scale experiments on the detection of free chlorine in sea water a few hours after the addition of the chemical and some bacteriological counts made at the same time. Although a marked reduction of the bacteria was secured, the process was soon abandoned on account of mechanical difficulties in its application, which was attempted through the filtration system.

The scheme of the electrolytic production of sodium hypochlorite from sea water was then broached to the manager and enthusiastically accepted, the idea that he was not adding any chemical to the water appealing to him, he having been fearful all along that his business might be injured if people learned that the water was being treated chemically.

An apparatus was purchased from a laundry machinery company and installed with a 300-gallon tank. The output of this apparatus, consisting of a single "cell" or electrolyzing box, was 30 gallons per hour of a solution that was found to contain 0.197 per cent of total available chlorine. The current necessary was about 20 amperes at 110 volts, giving a current consumption of 2,200 watts per hour, which at 4 cents per kilowatt would amount to $0.088 per hour of operation.

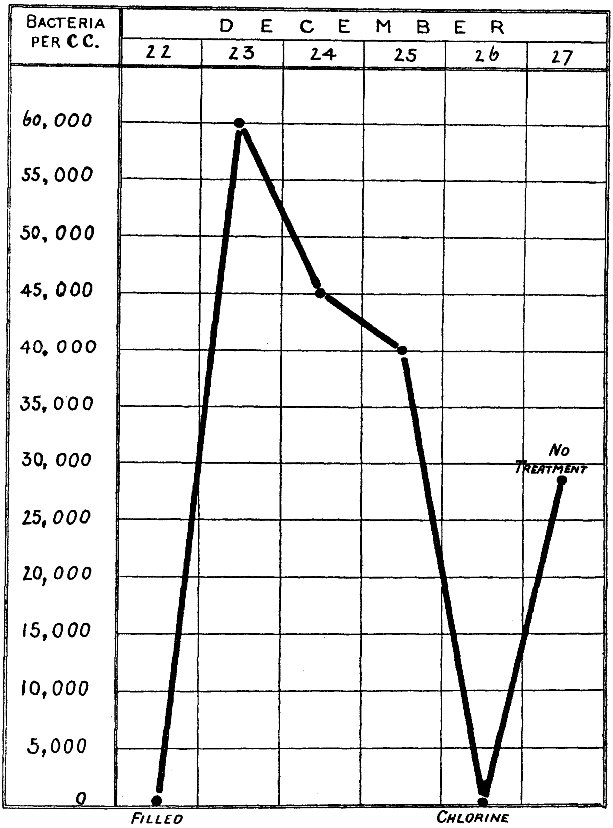
This solution was then added to the water in such quantity as to give 1.8 parts of chlorine per million of water.

The following charts show the results of the chlorine treatment under varying conditions (see charts 1, 2, 3, and 4).

In chart 1 the first count is 560 per cubic centimeter in a sample taken a few hours after the filling. The sample taken on December 26 at 11 a. m., the chlorine having been added the night before in the proportion of 1.8 parts per million, was 900, the count rising the next day without treatment to 28,000.

In chart 2 there is shown a rapid rise in the count, from 3,000 taken a few hours after filling to 61,000 on the third day. The addition of 1.8 parts of chlorine brought the count down to 4,500 and the repetition of the chlorine every night resulted as shown. In this table the chlorine was introduced by way of the deep end of the tank through openings near the bottom.

CHART 1.

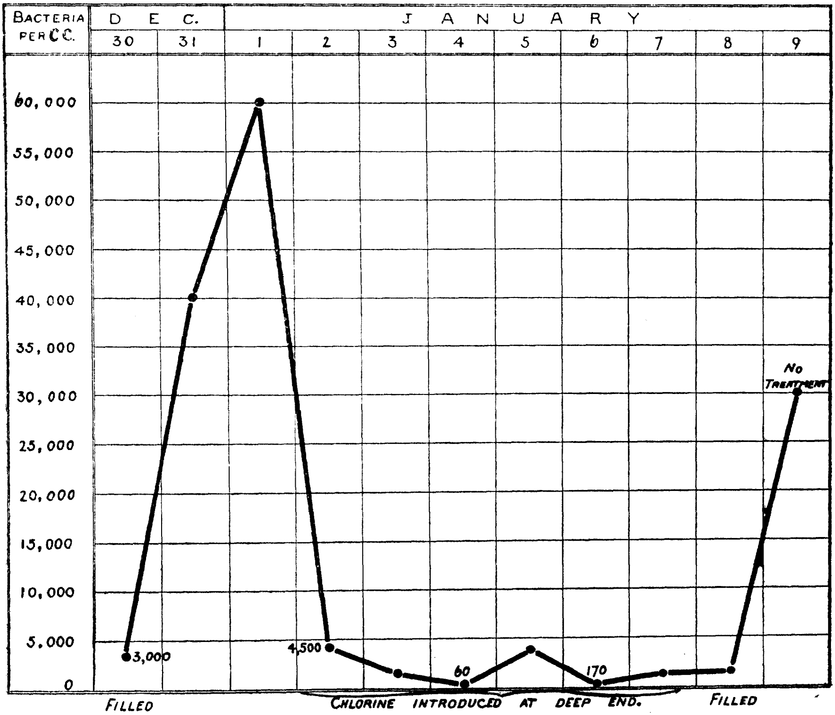


In chart 3 the first three counts were without chlorine and the last three were after the addition of 2.8 parts per million, added by way of openings above the water at the shallow end of the tank. Since the highest count in this series was obtained after the addition of an increased amount of chlorine, it was concluded that the chlorine solution introduced by means of an injector in the circulating system and admitted to the tank through openings above the water was mostly lost into the atmosphere; so the system was changed again to the deep end.

In chart 4 the chlorine was introduced through the deep end of the tank in amounts of 2.8 parts per million and the count did not rise above 112 bacteria per cubic centimeter, the treatments being given nightly after business hours.

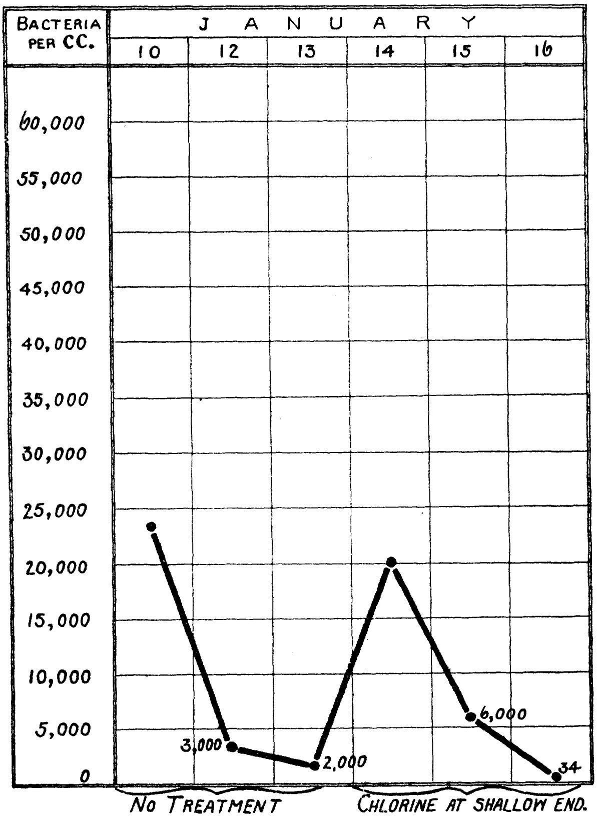
After the fourth daily addition of 2.8 parts of chlorine a number of complaints were received of an odor to the water, some of the bathers complaining that their skin was dried up and made harsh by the water. Others wanted to know whether chloride of lime was being added. These instances of the play of the imagination on the part of the public recall the experience of some of the eastern cities upon the introduction of the use of chlorine to purify the drinking-water supply. The editor of the Journal of the American Medical Association in an editorial on this subject remarks that "a humorous touch is given the matter by the imaginary grievances that find utterance, such as the fancied injury to delicate fabrics, bleaching of the hair, and the like. Before the chemical is added complaints that the tap water has an unpleasant taste or smell come from people who have read in the newspapers that the hypochlorite treatment is about to be instituted."

CHART 2.



In consequence of this the chlorine was omitted altogether one night, and then resumed again, the quantity being alternated, 1.8 parts one night and 2.8 the next. After the second addition of 1.8 parts of chlorine, the count ran up to 40,000, so it was decided to add 2.8 parts nightly, omitting the treatment only when the odor of chlorine became noticeable. Further experiments will be made to determine whether chemical tests can be relied upon to determine this point, as the amount of chlorine necessary to become noticeable varies with the amount of organic matter present in the water and therefore with the number of bathers using the tank.

CHART 3.

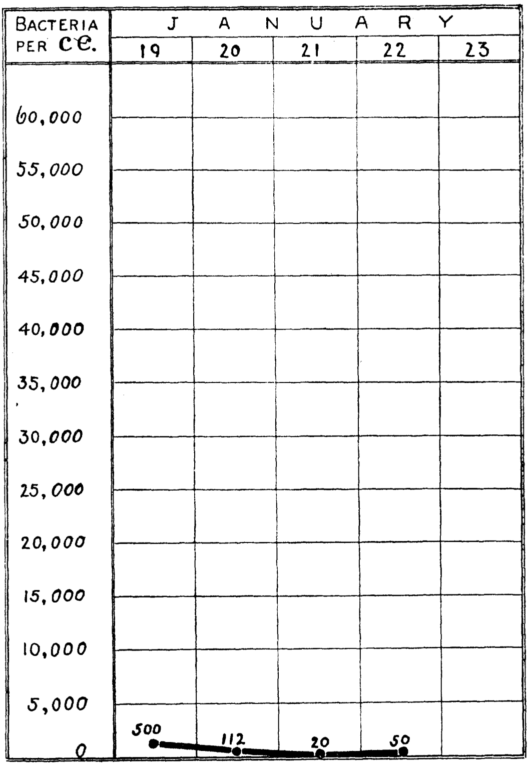


This odor is not due to the presence of free chlorine in the water, the existence of which is not possible so long as the water has an alkaline reaction, but to the presence of chlorine substitution products formed from the organic substances in the water.

The first use of chlorine on a large scale for the sterilization of drinking water was in 1908, when the water of Bubbly Creek, a highly polluted stream supplying the stockyards of Chicago, was treated with chloride of lime, 45 pounds per million gallons being used. As a result of this treatment the water was made far superior bacteriologically to that of Chicago itself.

The following cities are now using chlorinated lime to purify their entire supply: New York, Philadelphia, Pittsburgh, Cleveland, Montreal, Council Bluffs, Milwaukee, Cincinnati, Omaha, Minneapolis, Niagara Falls, and many others.

CHART 4.



CHLORINE INTRODUCED AT DEEP END.—2.8 PARTS PER MILLION.

As a result of our investigations in connection with the use of chlorine in the disinfection of swimming baths, the simplicity of application and the accurate results obtainable in the disinfection of the water, it would seem to be a desirable addition to public-health regulations to require the chlorine treatment of all swimming baths. The electrical generation of chlorine is inexpensive, costing from 30 to 60 cents per 100,000 gallons, according to the price of current, and to those institutions having their own electrical plant, next to nothing.

Chloride of lime is still cheaper, requiring only the installation of a cement-lined mixing tank with arrangements for pumping the clear solution into the plunge water and a flushing arrangement to carry off the lime sludge.

Most plants having a circulating system, there is no difficulty in introducing the chlorine solution by a pump directly into the feed pipe to the plunge. A force pump is better than a steam injector, as the high heat generated in the operation of the latter is a cause of the loss of some of the chlorine.

Baths using fresh water should be treated in the same way, and if it is desired to generate the chlorine electrically a concentrated solution of salt is subjected to the action of the current, the amount of the solution thus obtained to be used depending upon a chemical estimation of the amount of chlorine produced.

Under the use of this method of purification it will not be necessary to change the water nearly so often as without treatment, thus effecting a considerable saving to the proprietors of establishments; but, inasmuch as the temptation will be to derive too great an advantage in this way, the process should be controlled by regulation prescribing a reasonable frequency of change and by occasional bacteriological tests to insure the proper attention on the part of the management of the institutions.